AMENDMENTS TO THE CLAIMS

Claims 9, 17, 34, 41, 42, 45, 47, 55, 57, 62, 64, and 67 are amended and Claims 21, 53, 54, 56, and 68 are canceled. Claims 1-8, 10-16, 18-20, 22-33, 35-40, 43, 44, 46, 48-52, 58-61, 63, 65, 66, and 69-71 remain as previously pending. Please amend the following claims as follows:

1. (Original) A system for enhancing intelligibility of a voice signal that is degraded by factors that reduce intelligibility of the voice signal, said system comprising:

an input configured to receive a voice signal that includes spoken words;

an aural filter operatively coupled to said input, said aural filter configured to filter said voice signal to produce a filter output signal wherein low frequencies below speech frequencies and high frequencies above speech frequencies are attenuated with respect to speech frequencies;

a speech expander operatively coupled to said aural filter to produce an expanded signal, said speech expander configured to amplify said filter output signal according to an amplifier gain, wherein said amplifier gain is a function of an envelope amplitude of said filter output signal; and

a combiner configured to combine at least a portion of said expanded signal and at least a portion of said voice signal to produce an enhanced signal representing said spoken words.

2. (Original) The system of Claim 1, wherein said system is configured to provide a transfer function that approximates an inverse of loudness contours for human hearing of tones in a sound field.

3. (Original) The system of Claim 1, wherein said speech expander comprises an envelope detector and a gain controlled amplifier, wherein at least a portion of said filter output signal is provided to an input of said envelope detector configured to detect an envelope amplitude of said at least a portion of said filter output signal.

4. (Original) The system of Claim 1, wherein said amplifier gain increases according to an attack time constant and said amplifier gain decreases according to a decay time constant.

5. (Original) A communication device for sending voice information to a communication receiver, where the voice information may become contaminated by noise that reduces the intelligibility of the voice information, said communication device comprising:

a sender configured to send a voice signal over a communication channel; and

a voice enhancer operably connected to said sender, said voice enhancer comprising:

an aural filter operatively coupled to a voice signal in said sender, said aural filter configured to filter said voice signal to produce a filter output signal wherein low frequencies below speech frequencies and high frequencies above speech frequencies are attenuated with respect to speech frequencies;

a speech expander operatively coupled to said aural filter to produce an expanded voice signal, said speech expander configured to amplify said filter output signal according to an amplifier gain, wherein said amplifier gain is a function of an envelope amplitude of said filter output signal; and

a combiner configured to combine at least a portion of said expanded voice signal and at least a portion of said voice signal to produce an enhanced voice signal.

6. (Original) The communication device of Claim 5, wherein said voice enhancer is configured to provide a transfer function that approximates an inverse of loudness contours for human hearing.

7. (Original) The communication device of Claim 5, wherein said speech expander comprises an envelope detector and a gain controlled amplifier, wherein at least a portion of said filter output signal is provided to an input of said envelope detector configured to detect an envelope amplitude of said at least a portion of said filter output signal.

8. (Original) The communication device of Claim 5, wherein said amplifier gain increases according to an attack time constant and said amplifier gain decreases according to a decay time constant.

9. (Currently Amended) A communication device configured to receive voice information from a communication sender, comprising:

a communication receiver configured to receive voice information from a communication channel; and

a voice enhancer operably connected to said communication receiver, said voice enhancer comprising:

an aural filter configured to filter an input signal to produce a filtered signal;

an expander comprising an amplifier configured to amplify said filtered signal to produce an amplified signal, wherein a gain of said amplifier is a function of an amplitude envelope of said filtered signal; and

a combiner configured to combine at least a portion of said amplified signal and at least a portion of said input signal to produce an output signal.

10. (Original) The communication device of Claim 9, wherein said communication device is a cordless telephone comprising a handset and a base unit.

11. (Original) The communication device of Claim 9, wherein said communication device is a cellular telephone.

12. (Original) The communication device of Claim 9, wherein said aural filter attenuates low and high frequencies with respect to middle frequencies.

13. (Original) The communication device of Claim 9, wherein said combiner adds at least a portion of said expanded voice signal to said input signal.

14. (Original) The communication device of Claim 9, further comprising a user control, said user control configured to enable and disable said voice enhancer.

15. (Original) The communication device of Claim 9, further comprising a user control, said user control configured to vary an amount of enhancement produced by said voice enhancer.

16. (Original) The communication device telephone of Claim 9, wherein said voice enhancer is configured to approximate an inverse of loudness contours of human hearing.

17. (Currently Amended) An apparatus, comprising:

an aural filter configured to filter an input signal to produce a filtered signal;

an expander comprising an amplifier configured to amplify said filtered signal to produce an amplified signal, wherein a gain of said amplifier depends in part on an envelope ~~is a function of~~ said filtered signal; and

a combiner configured to combine at least a portion of said amplified signal and at least a portion of said input signal to produce an output signal.

18. (Original) The apparatus of Claim 17, wherein said aural filter attenuates low and high frequencies with respect to middle frequencies.

19. (Original) The apparatus of Claim 17, wherein said combiner adds at least a portion of said expanded voice signal to said input signal.

20. (Original) The apparatus of Claim 17, wherein a gain of said amplifier depends in part upon a property of said filtered signal.

21. (Canceled)

22. (Original) The apparatus of Claim 17, wherein said aural filter attenuates low frequencies with respect to middle frequencies.

23. (Original) The apparatus of Claim 17, wherein a gain of said amplifier increases according to an attack time constant.

24. (Original) The apparatus of Claim 17, wherein a gain of said amplifier decreases according to a decay time constant.

25. (Original) The apparatus of Claim 17, wherein said aural filter attenuates low frequencies and high frequencies with respect to middle frequencies.

26. (Original) The apparatus of Claim 17, wherein said apparatus is configured to approximate an inverse of loudness contours of human hearing.

27. (Original) The apparatus of Claim 17, operably connected to a recording device.

28. (Original) The apparatus of Claim 17, said apparatus incorporated into a telephone and adapted to improve intelligibility of voice information processed by said telephone.

29. (Original) The apparatus of Claim 17, said apparatus incorporated into a hearing aid and adapted to improve intelligibility of voice information processed by said hearing aid.

30. (Original) The apparatus of Claim 17, said apparatus incorporated into a public-address system and adapted to improve intelligibility of voice information processed by said public-address system.

31. (Original) The apparatus of Claim 17, said apparatus incorporated into a communication system and adapted to improve intelligibility of voice information processed by said communication system.

32. (Original) The apparatus of Claim 17, wherein said aural filter is an analog filter.

33. (Original) The apparatus of Claim 17, wherein said aural filter is a digital filter.

34. (Currently Amended) A method for enhancing intelligibility of voice information, comprising the steps of:

filtering at least a portion of a first signal that includes voice sounds to produce a filtered signal having an amplitude envelope; and

expanding at least a portion of said filtered signal to produce an enhanced signal having voice sounds modified by a function of at least a portion of the amplitude envelope~~an amount that approximates an inverse of loudness contours~~.

35. (Original) The method of Claim 34, further comprising the step of combining at least a portion of said first signal with said enhanced signal.

36. (Original) The method of Claim 35, wherein said step of combining comprises adding at least a portion of said first signal to said enhanced signal.

37. (Original) The method of Claim 34, wherein said step of expanding comprises amplifying said filtered signal using an amplifier having a variable gain.

38. (Original) The method of Claim 37, wherein said variable gain is a function of at least a portion of said filtered signal.

39. (Original) The method of Claim 37, wherein said variable gain is a function of at least a portion of an envelope of said filtered signal.

40. (Original) The method of Claim 37, wherein said variable gain is a function of at least a portion of an average power of said filtered signal.

41. (Currently Amended) The method of Claim 37, wherein said variable gain is a function of at least a portion of ~~said~~ a square-root of the mean of the squares average of said filtered signal.

42. (Currently Amended) The method of Claim 37, wherein said variable gain depends upon at least a portion of ~~said~~ an average peak value of said filtered ~~voice~~ signal.

43. (Original) The method of Claim 37, wherein said variable gain increases according to an attack time constant.

44. (Original) The method of Claim 37, wherein said variable gain decreases according to a decay time constant.

45. (Currently Amended) The method of Claim ~~43~~44, wherein said attack time constant is shorter than said decay time constant.

46. (Original) The method of Claim 37, wherein said variable gain depends upon at least a portion of said first signal.

47. (Currently Amended) The method of Claim 34, wherein said step of filtering comprises filtering said ~~electrical voice~~first signal using an aural filter.

48. (Original) The method of Claim 47, wherein said aural filter comprises a bandpass filter.

49. (Original) The method of Claim 47, wherein said aural filter attenuates low frequencies and high frequencies with respect to middle frequencies.

50. (Original) The method of Claim 47, wherein said first signal comprises noise components and voice components, and wherein said aural filter combined with said speech expander reduces the degradation of said voice components by said noise components.

51. (Original) The method of Claim 34, further comprising the step of providing said enhanced signal to a loudspeaker system to be projected as sound into an area of ambient noise.

52. (Original) The method of Claim 34, further comprising the step of providing said enhanced signal to a recording device.

53. (Canceled)

54. (Canceled)

55. (Currently Amended) An apparatus for enhancing intelligibility of voice information, said apparatus comprising:

aural filter means for filtering an input signal to produce a filtered signal, said input signal containing voice information; ~~and~~

expander means for expanding said filtered signal to produce an expanded signal, wherein the filtered signal is expanded at least in part as a function of an amplitude envelope of the filtered signal; and

combiner means for combining at least a portion of said expanded signal with at least a portion of said input signal.

56. (Canceled)

57. (Currently Amended) An apparatus, comprising:

an input configured to receive an input signal; and

a dynamic filter configured to filter said input signal to produce an enhanced signal with modified voice components, said dynamic filter configured to provide a transfer function that depends at least in part on an envelope of the input signal~~approximates an inverse of loudness contours for humans of a selected hearing acuity~~.

58. (Original) The apparatus of Claim 57, wherein said dynamic filter comprises a bandpass filter and an expander.

59. (Original) The apparatus of Claim 57, wherein said dynamic filter comprises an aural filter.

60. (Original) The apparatus of Claim 57, wherein said dynamic filter comprises a filter that attenuates low and high frequencies relative to middle frequencies.

61. (Original) The apparatus of Claim 57, wherein said dynamic filter comprises an expander.

62. (Currently Amended) The apparatus of Claim 57, further comprising a combiner configured to combine at least a portion of said input signal with at least a portion of said enhanced ~~voice~~ signal.

63. (Original) The apparatus of Claim 57, further comprising a user control, said control configured to allow a user to adjust a transfer function of said dynamic filter.

64. (Currently Amended) A method of improving the intelligibility of voice sounds contained within a signal source when the signal source is reproduced through a loudspeaker, said method comprising the following steps:

detecting an envelope ~~sensing an amplitude level~~ of a signal source to produce a control signal;

filtering the signal source according to a frequency response related to human hearing characteristics to produce a filtered signal;

modifying the frequency response used to filter said signal source wherein the amount of modification is a function of the control signal; and

combining the signal source with the filtered signal to produce an output signal having enhanced voice sounds.

65. (Original) The method of Claim 64, wherein said step of modifying the frequency response comprises the step of increasing the gain of said frequency response in response to an increase in the amplitude level of voice sounds within said signal source.

66. (Original) The method of Claim 64, wherein said signal source is part of a composite multi-channel audio signal and said signal source contains voice sounds mixed with noise.

67. (Currently Amended) A method of emphasizing speech sounds contained within a signal source to produce an output signal comprises the following steps:

filtering said signal source to produce a filtered signal wherein said filtered signal includes a frequency range of said signal source containing at least some of said speech sounds;

analyzing at least a portion of said filtered signal to produce a control signal wherein said control signal represents an amplitude envelope ~~a preselected characteristic~~ of said at least a portion of said filtered signal;

amplifying said filtered signal during an amplification period to provide an enhancement signal wherein the level of amplification of said filtered signal is a function of the control signal; and

combining said enhancement signal with said signal source to produce an output signal.

68. (Canceled)

69. (Original) The method of Claim 67, wherein said frequency range corresponds to a frequency range containing typical human speech.

70. (Original) The method of Claim 67, wherein said amplification period is a function of a predetermined decay time constant.

71. (Original) The method of Claim 67, wherein said signal source is part of a composite signal representing voice and ambient information for presentation to a listener.